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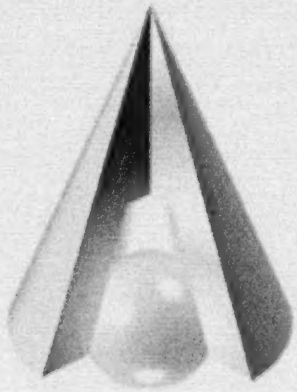
Immigration, Low Income and Income Inequality in Canada: What's New in the 2000s?



by Garnett Picot and Feng Hou

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...	not applicable
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0^s	value rounded to 0 (zero) where there is a meaningful distinction between true zero and the value that was rounded
^{p}	preliminary
^{r}	revised
x	suppressed to meet the confidentiality requirements of the *Statistics Act*
^{E}	use with caution
F	too unreliable to be published
*	significantly different from reference category ($p < 0.05$)

Immigration, Low Income and Income Inequality in Canada: What's New in the 2000s?

by

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Abstract

This paper documents changes in low-income and high-income rates and in family-income inequality among immigrants and Canadian-born persons over the 1995-to-2010 period. In addition, it estimates the extent to which declining low-income rates among immigrants were attributable to changing compositional characteristics over this period, and the direct role that immigration played in low-income and income-inequality trends in Canada. Both national and regional results are presented. There are four major findings. First, in contrast to the 1980s and 1990s, immigrant low-income rates declined in the 2000s. The decline was particularly evident in the western regions, but was not observed in Toronto. However, because low-income rates also declined among the Canadian-born through the 2000s, immigrants' low-income rates relative to the Canadian-born remained high in most regions. Manitoba and Saskatchewan were exceptions in this regard. Second, changes in immigrant characteristics and selection programs accounted for about one-third of the decline in low-income rates among recent immigrants. Again, this varied by region. Third, while rising immigrant low-income rates accounted for virtually all of the increase in the national low-income rate over the 1980s and 1990s, immigrants accounted for little of the decline in the national low-income rate during the 2000s. Immigrants also accounted for little of the rise in the high-income rate observed between 1995 and 2010. Fourth, immigration contributed very little to national trends in either family-income inequality or family-earnings inequality since the mid-1990s.

Executive summary

During the 1980s and 1990s, immigration was associated with the rise in low-income rates and family-income inequality in Canada. Over the 2000s, there were significant changes in the labour market and in immigrant selection. This paper focuses on the direct effect of immigration on the change in low income and family-income inequality over the 1995-to-2010 period. The paper outlines recent trends in low-income rates and income inequality for both the Canadian-born and immigrants. The low-income rate in Canada fell during the 2000s. Was this driven in part by changes in economic outcomes among immigrants? Inequality increased considerably in the late 1990s. Did immigration contribute to this increase?

This paper uses Statistics Canada's Longitudinal Administrative Databank (LAD) as the primary data source. The LAD is a random, 20% sample of the T1 Family File, which is a yearly cross-sectional file of all taxfilers and their families. Immigrants who have entered Canada since 1980 can be identified in this file. Furthermore, information based on immigrant landing records, such as education at entry, age at entry, intended occupation, gender, family status, whether the immigrant speaks English or French at entry, and immigrant class are included in the LAD file for immigrants. All immigrants who filed a return at any time during their tenure in Canada are included in the study sample. The low-income status in this study is based on a fixed low-income measure, defined as the average of one-half of the median adult-equivalent adjusted family incomes in 1995, 2000, 2005 and 2010. The income in each year is reported in 2010 constant dollars, i.e., is adjusted for inflation over the 1995-to-2010 period.

Low-income rates among immigrants declined significantly over the 2000s, although their relative (to the Canadian-born) low-income rates did not improve. There were three regional exceptions to this general pattern: immigrant low-income rates did not fall in Toronto as in other regions during the 2000s; low-income rates did not fall among the Canadian-born in Toronto as in other regions during the 2000s; and rates among immigrants decreased the fastest in Manitoba and Saskatchewan, where relative rates among recent immigrants fell back to around 1.2 times those of the Canadian-born, levels of relative rates not seen since the early 1980s.

At the national level, changes in immigrant characteristics—notably rising educational attainment and changing source regions—accounted for about one-third of the decline in the low-income rate among recent immigrants (in Canada five years or less) during the 2000s. The effect of compositional changes differed across regions. Changes in immigrant characteristics and entry programs accounted for between one-fifth and one-half of the decrease in low-income rates among recent immigrants, depending on the region.

Declining immigrant low-income rates contributed little to the fall in low-income rates among the general population in Canada during the 2000s. Unlike the 1990s, when rising immigrant population shares and low-income rates accounted for most of the increase in low-income rates in Canada, the decrease in the rates during the 2000s was driven primarily by falling rates among the Canadian-born.

High-income rates rose between 1995 and 2010 among both immigrants and the Canadian-born, although they were higher among the latter group. Immigration contributed little to the increase in the overall high-income rate in Canada over that period.

Both family-income inequality and family-earnings inequality increased in Canada from 1990 to 2010, but the majority of the rise occurred during the late 1990s. The paper concludes that for Canada as a whole, immigration contributed little to the increase of the late 1990s in either income or earnings inequality. Family income and earnings inequality rose among the immigrant population during the late 1990s, as it did among the Canadian-born, but the immigrant population did not contribute disproportionately to the overall increase. There was little increase in income inequality in the 2000s.

1 Introduction

During the 1980s and 1990s, immigration had a significant negative effect on low-income rates and family-income inequality in Canada. The rise in immigration levels during that period were accompanied by concerns about immigrants' declining economic outcomes. While low-income rates among the Canadian-born fell through the 1990s, they rose among immigrants. As a result, rising immigrant low-income rates accounted for virtually all of the increase in the national low-income rate during that period (Picot and Hou 2003). Immigration had an effect on family-income inequality as well. One study found that as much as one-half of the small rise in inequality during the early 1990s was associated with the immigrant population (Moore and Pacey 2003). The effect was most pronounced in the large cities where the immigrant population grew most. The preceding papers were concerned with the effect of immigration on the low income and inequality of the total Canadian population (immigrants plus the Canadian-born) due to rising shares of immigrants and their worsening economic outcomes. In this paper, this is referred to as the direct effect of immigration on low income and family-income inequality.

There is another body of literature that focuses on the effect of immigration on the wages and the wage distribution of domestically-born workers (in our case the Canadian-born). Rising shares of immigrants in the Canadian population can potentially affect the wages of the Canadian-born. This can affect low-income rates, as earnings are the largest component of income for most families. It can also influence wage inequality among the Canadian-born. In this paper, this is referred to as the indirect effect of immigration on low income and inequality. The international literature on this topic is quite extensive, but only a small number of Canadian papers exist. The international literature tends to find that immigration has only a very small effect on the wages of domestic workers, whether positive or negative (Longhi, Nijkamp and Poot 2009; European Economic Association 2012; Card 2009).

In this context, it seems likely that the indirect effect of immigration on low income or family-income inequality among the Canadian-born population would be quite small. However, the direct effect of a rising share of immigrants in the population, combined with relatively poor economic outcomes of many recent immigrants, can significantly affect low-income and inequality levels for the total population in Canada. In the United States, Card (2009) found that immigration had little effect on wage inequality among the American-born (i.e., the indirect effect), while the direct effect on inequality was larger, although still not dramatic. This direct effect would be most pronounced in cities and regions where immigrants constitute a large share of the population.

This paper briefly discusses the indirect effect of immigration and examines in detail the direct effect of immigration on the change in low income and family-income inequality over the 1995-to-2010 period. Recent trends in low-income rates and income inequality for both the Canadian-born and immigrants are outlined: the Canadian low-income rate fell during the 2000s, and whether this was driven in part by changes in economic outcomes of immigrants is explored. The rise in Canadian income inequality was concentrated in the late 1990s, and this paper looks at whether immigration contributed to this increase. The two preceding questions are the central focus of this paper, with results produced at the national and provincial levels and for major metropolitan areas.

The primary data source used in this study is Statistics Canada's Longitudinal Administrative Databank (LAD). The LAD is a random, 20% sample of the T1 Family File, which is a yearly cross-sectional file of all taxfilers and their families. Individuals selected for the LAD are linked across years to create a longitudinal profile of each individual. Since the early 1990s, approximately 95% of working-age Canadians filed tax returns. Immigrants who have entered Canada since 1980 can be identified in this file. Furthermore, information based on immigrant landing records, such as education at entry, age at entry, intended occupation, gender, family

status, whether the immigrant speaks English or French at entry, and immigrant class are included in the LAD file for immigrants. All immigrants who filed a return at any time during their tenure in Canada are included in the sample.

2 Immigration and low-income rates in Canada

2.1 Low-income trends in Canada

This paper is concerned with trends, and in particular the change in the low-income rate between 1995 and 2010. Low-income rates are very cyclically sensitive, rising in recessions and falling in expansions. To assess longer-term trends—abstracting from cyclical variation—focus is put on the years of 1981, 1989, 2000 and 2007. The low-income rate most commonly reported by Statistics Canada[1] fell during the 1980s, from 11.6% in 1981 to 10.2% in 1989 (Chart 1). Over the 1990s the low-income rate rose marginally, reaching 12.5% by 2000. A significant decline followed during the 2000s, as the rate fell to 9.1% in 2007. The low-income rate rose marginally during the 2008-to-2009 recession and fell again to 8.8% by 2011. It is conceivable that improvements in the low-income rate among immigrants contributed to the falling low-income rate in Canada during the 2000s.

Chart 1
Low-income rate in Canada, 1976 to 2011

Note: Based on after-tax, after-transfer income. The rate is the percentage of people with a family income below the low-income cut-offs (LICOs), 1992 base.

Source: Statistics Canada, CANSIM table 202-0802 (based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics).

The trends in low-income rates in Canada can differ depending on the data source, definition of income, and low-income cut-offs that are used. The trends based on the Longitudinal Administrative Databank (LAD) are similar to those reported above from the survey data,

1. The low-income rate is based on Statistics Canada's low-income cut-offs (LICOs) for after-tax income. The data are from the Survey of Labour and Income Dynamics and the Survey of Consumer Finances.

although the levels are quite different for a number of reasons[2] (Table 1). The administrative data suggest that the low-income rate fell by about one-third between 1995 and 2010, while the survey data suggest a 39% drop. Some of this decline would be due to business cycle effects, notably the improvement in the economy between 1995 and 2000. Both the administrative and the survey data show that about one-third of the overall decline between 1995 and 2010 occurred during the expansion of the late 1990s. This is likely the normal decline in low-income rates observed over the last part of a business cycle. But the decline in the low-income rate during the 2000s is likely due at least in part to other factors, possibly including declining immigrant low-income rates.

Table 1
Low-income rates in Canada

	Census data[1]	Taxation data[2]	Survey data[3]
		percent	
1980	17.1	..	11.6
1985	18.7	..	13.0
1990	15.5	..	11.8
1995	19.1	20.1	14.5
2000	15.6	18.1	12.5
2005	15.3	15.5	10.8
2010	..	13.7	8.8

.. not available for a specific reference period

1. Based on before-tax, after-transfer family income using Statistics Canada's low-income cut-offs (LICOs) (see source below).

2. Taxation data calculated by the authors, based on after-tax, after-transfer family income, using a fixed low-income measure (LIM).

3. Based on after-tax, after-transfer family income from the source below, using the LICO.

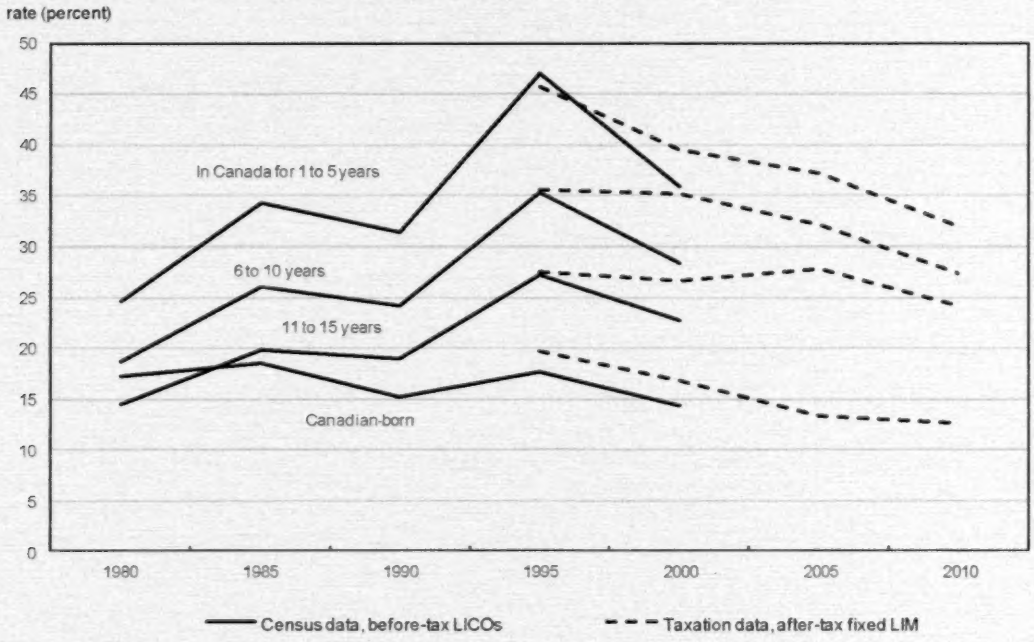
Sources: G. Picot, Y. Lu, and F. Hou. 2009. "Immigrant low-income rates: The role of market income and government tranfers." *Perspective on Labour and Income* 10 (12) : 13–27 (for census data); Statistics Canada, Longitudinal Administrative Databank, 1995 to 2010 (for taxation data), and CANSIM table 202-0802 (based on the Survey of Labour and Income Dynamics and the Survey of Consumer Finances) (for survey data).

2. Low-income rates are compared across three data sources: survey data, census data and administrative data. The administrative data consist of T1 taxation data linked to the landing records of immigrants who entered Canada since 1980. The low-income rate levels differ across these data sources for a few reasons. First, in the 1980s and 1990s the census collected before-tax income data, and low-income rates were calculated on that basis. This study instead uses welfare measures based on after-tax data, which are available in the taxation and survey data, and reported in Table 1. Second, the census and the survey data use the low-income cut-offs (LICOs), while the administrative data use a fixed low-income measure (LIM) cut-off. The fixed LIM is simply the average of one-half of the median adult-equivalent-adjusted after-tax family income, held constant over the entire 1995-to-2010 period. The adult-equivalent-adjusted family income is calculated on a constant dollar basis (adjusted to the 2010 value of the Consumer Prince Index) in each of the years covered by the study (1995, 2000, 2005, and 2010), and the average of these values is used as the low-income threshold in all years. Finally, the surveys tend to miss some low and high incomes reported in the taxation and census data (Frenette, Green and Picot 2004) with an overall response rate of around 80%. The response rate is much higher in the census and taxation data. As a result of these differences in response rates with type of income used and the low-income cut-off applied, low-income rates are higher in the administrative and census data than in the survey data, although the trends are similar.

2.2 Trends in immigrant low-income rates

Using census data, before-tax income, and the low-income cut-offs (LICOs), Picot and Hou (2003) found that both absolute and relative (to the Canadian-born) low-income rates among immigrants rose through the 1980s and 1990s (abstracting from business cycle fluctuations). This increase was observed not only among recent immigrants (those in Canada for less than five years), but also among immigrants in Canada for 6 to 10 and 11 to 15 years. Indeed, low-income rates increased by roughly 50% among each of these groups. This was evident across all education, age and language groups, but was concentrated primarily among immigrants from Asia, Africa and Southern and Eastern Europe. The trends among immigrants in Canada for more than 15 years closely resembled those observed among the Canadian-born population. In relative terms, low-income rates among recent immigrants increased from 1.4 to 2.5 times that of the Canadian-born population between 1980 and 2000 (Chart 2).

Chart 2
Low-income rates of immigrants, Canada, 1980 to 2010



Note: LICOs: low-income cut-offs; LIM: low-income measure.
Sources: Statistics Canada, Census microdata files, 1981 to 2000, and Longitudinal Administrative Databank, 1995 to 2010.

Since 1995, low-income rates among immigrants and the total population have been declining. Among recent immigrants, the after-tax low-income rates using a fixed low-income measure (LIM)[3] fell from 45.7% to 31.9% between 1995 and 2010, a decline of one-third (Table 2). But, as noted above, there was a substantial decline in the low-income rate among the total

3. The LIM is measured as the average of one-half of the median adult-equivalent-adjusted family income in 1995, 2000, 2005 and 2010 (at $16,350). The income in each year is adjusted for inflation over the 1995-to-2010 period to 2010 constant dollars. This is in essence a 'fixed' (not relative) low-income measure.

population over this period. The comparison group[4] used in this study, consisting mainly of the Canadian-born, also saw its low-income rate fall by roughly one-third, from 18.6% to 12.5%. Hence, there was little change in the relative low-income ratio among recent immigrants, which remained about 2.6 times that of the Canadian-born in 2010 (Chart 3). The rate for the comparison group (largely Canadian-born) acts as a control for business cycle and policy changes that can affect the low-income rate of all groups. Over the study period, the income distribution shifted significantly to the right for all these groups, although recent immigrants were more likely to locate at the bottom of the income distribution than other groups in both 2000 and 2010 (Charts A.1 and A.2, Appendix A).

4. The comparison group includes the Canadian-born and immigrants who have been in Canada for more than 15 years. In the 2006 Census, the Canadian-born constituted about 89% of this comparison group. Based on the 2006 Census, the low-income rate of immigrants in Canada for more than 15 years (14.7%) was slightly higher than that among the Canadian-born population (13.3%), but much lower than that of immigrants in Canada for up to 15 years (30.4%). Immigrants in Canada for more than 15 years cannot be identified in the taxation data before 1995 because only immigrants who have entered Canada since 1980 are identified in those data. The same definition of the comparison group is used in 2000, 2005 and 2010 in order to maintain comparability among years.

Table 2
Associations between changes in immigrant composition and changes in low-income rates among recent immigrants (living in Canada for 5 years or less)

	Time 1 low-income rate	Time 2 low-income rate	Change in rate	Change in rates associated with							
				Changes in immigrant composition						Changes in regression coefficients	Joint change[1]
				Total	Admission class	Education	Language	Source region	Age, family structure		
	percent			percentage points							
1995 to 2000											
Canada	45.7	39.4	-6.3	-1.9	-0.3	-1.3	-0.1	0.6	-0.9	-4.9	0.6
Atlantic region	40.2	38.9	-1.3	-0.2	-0.5	-1.3	1.3	1.1	-0.8	-4.3	3.2
Quebec	51.8	41.5	-10.3	-2.7	0.5	-1.4	-0.2	-1.0	-0.6	-7.8	0.2
Ontario	47.4	39.7	-7.7	-2.1	-0.5	-1.9	0.0	1.3	-1.1	-6.3	0.7
Manitoba	36.2	27.8	-8.4	-1.9	0.1	-1.9	-0.1	1.1	-1.1	-7.6	1.2
Saskatchewan	37.7	31.2	-6.5	-3.3	-1.3	-0.7	-0.2	-0.4	-0.6	-2.6	-0.7
Alberta	50.1	36.5	-13.6	-2.9	-0.5	-1.6	-0.1	0.7	-1.3	-11.4	0.7
British Columbia	45.4	46.6	1.2	-2.0	-1.5	-0.6	-0.1	0.6	-0.4	1.6	1.6
Montréal	53.9	42.7	-11.3	-2.7	0.5	-1.5	-0.2	-1.0	-0.5	-8.4	-0.1
Toronto	46.8	39.0	-7.8	-1.8	-0.3	-1.7	0.0	1.4	-1.1	-6.5	0.5
Vancouver	47.2	48.0	0.8	-2.3	-1.8	-0.5	-0.2	0.5	-0.4	1.6	1.5
Next five largest census metropolitan areas	53.0	40.0	-13.1	-3.5	-0.8	-2.3	0.0	0.8	-1.2	-9.9	0.4
Other census metropolitan areas	44.4	40.1	-4.3	-1.4	-0.3	-1.4	0.2	1.1	-1.0	-4.6	1.7
2000 to 2010											
Canada	39.4	31.9	-7.5	-2.5	-0.2	-1.0	-0.4	-0.7	-0.3	-4.2	-0.8
Atlantic region	38.9	28.8	-10.1	-4.6	-3.0	0.2	-0.7	-1.2	0.0	-8.8	3.4
Quebec	41.5	31.3	-10.2	-4.2	-1.3	-1.5	-0.4	-0.4	-0.5	-8.0	2.0
Ontario	39.7	38.8	-0.8	-0.6	0.2	-0.8	-0.2	0.2	0.1	0.3	-0.5
Manitoba	27.8	16.3	-11.6	-2.1	0.8	-1.1	0.4	-1.2	-1.0	-3.8	-5.7
Saskatchewan	31.2	14.7	-16.5	-5.0	-1.8	0.3	0.5	-3.5	-0.6	-12.6	0.9
Alberta	36.5	22.1	-14.4	-5.1	-2.7	-1.5	0.0	-0.5	-0.4	-10.5	1.2
British Columbia	46.6	33.2	-13.5	-1.4	2.4	-0.9	-0.9	-1.9	-0.2	-9.2	-2.8
Montréal	42.7	33.0	-9.6	-4.8	-1.5	-1.7	-0.5	-0.5	-0.7	-7.2	2.4
Toronto	39.0	38.5	-0.4	-0.7	0.2	-0.8	-0.1	-0.1	0.0	0.6	-0.3
Vancouver	48.0	35.6	-12.4	-1.2	2.2	-0.9	-0.5	-1.8	-0.2	-8.7	-2.5
Next five largest census metropolitan areas	40.0	28.8	-11.1	-4.3	-2.2	-1.3	-0.6	0.0	-0.2	-7.1	0.2
Other census metropolitan areas	40.1	33.8	-6.3	-1.4	-0.7	-0.9	-0.8	0.8	0.1	-2.9	-2.1

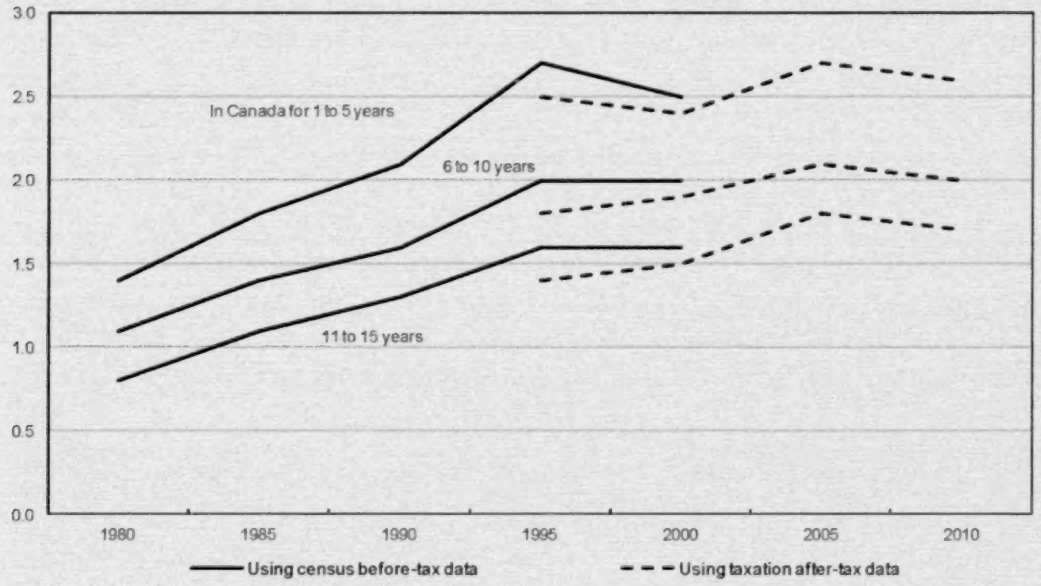
1. The joint change is the product of changes in immigrant characteristics and changes in the regression coefficient associated with each characteristic.

Note: For the earlier period (1995 to 2000), "time 1" is 1995 and "time 2" is 2000; for the later period (2000 to 2010), "time 1" is 2000 and "time 2" is 2010.

Source: Statistics Canada, Longitudinal Administrative Databank.

Chart 3
Low-income rates of immigrants relative to the comparison group, Canada, 1980 to 2010

relative low-income ratio



Note: The comparison group includes the Canadian-born and immigrants who have been in Canada for more than 15 years.
Sources: Statistics Canada, Census microdata files, 1981 to 2000, and Longitudinal Administrative Databank,1995 to 2010.

Over the 1995-to-2010 period, declines in the absolute low-income rates of immigrants in Canada for 6 to 10 years and 11 to 15 years were also observed (23% and 12% declines respectively) (Chart 2), although the relative low-income ratios of these groups rose marginally (Chart 3).

Since both immigrant shares of the population and economic outcomes differ across regions, the low-income trend data are provided for the regions of Canada as well as the larger cities in Appendix Table A.1. The trends in low-income rates in most regions generally reflect those reported at the national level above. That is to say, absolute rates fell somewhat over the 2000s, but relative rates remained more or less stable, particularly for recent immigrants. However, there are a few exceptions to this observation. In Toronto, low-income rates did not decline significantly among immigrants during the 2000s, and did not fall among the Canadian-born (i.e., the comparison group). Toronto was the only region/city that did not experience an improvement in low-income rates among immigrants or the Canadian-born during that decade.

The other major exceptions were Manitoba and Saskatchewan. Through the 2000s, they experienced significant increases in the number of immigrants admitted through the Provincial Nominee Program. The share of the population consisting of recent immigrants doubled in both provinces (Table A.1), although remaining well below that observed in Montreal, Toronto and Vancouver. These two provinces also experienced the most rapid decline in low-income rates among immigrants over the 2000s, and were the only two regions where recent immigrants' relative (to the Canadian-born) low-income rates fell significantly. In Manitoba, low-income rates among recent immigrants declined by 40% over the 2000s to 16.3%, well below rates in most other regions (Table A.1). The rate fell by 50% in Saskatchewan. In both provinces, the relative low-income ratios fell back to around 1.2, levels not seen in Canada since the early 1980s. In Alberta and British Columbia, the low-income rates among immigrants declined significantly

during the 2000s, but the relative rates remained in the 1.9 to 2.4 range by 2010, suggesting no real improvement beyond what was observed for the population as a whole, and well above relative levels observed in earlier decades.

2.3 Did the rates among recent immigrants decline because of changing programs and immigrant characteristics?

The immigrant selection system changed significantly over the 2000s. The *Immigration and Refugee Protection Act* introduced in 2002 altered the points system used to select federal skilled workers. As a result, the educational attainment of new immigrants increased, their "intended" occupational distribution moved somewhat away from engineers and information technology workers towards other occupations, their language skills improved, and the distribution of source regions shifted substantially. These changes in composition tended to increase the average earnings of federal skilled-worker principal applicants entering the country after 2004 (CIC 2010).

The other major compositional shift was the expansion of the Provincial Nominee Program (PNP), particularly in Manitoba and Saskatchewan. Employers play a larger role in selection in this program than in the Federal Skilled Worker Program (FSWP); hence more immigrants entered Canada with a job in place. The result was that during the first few years after entering Canada, PNP immigrants had, on average, higher earnings than those entering under the FSWP. However, federal skilled workers' earnings surpassed those in the PNP after about five years, likely due to their higher educational attainment levels (CIC 2011).

The statistics on recent immigrants reflect the compositional shifts outlined above. Between 2000 and 2010, the proportion with a university degree increased from 31% to 42%, and, among recent immigrants whose mother tongue was not English, the share able to speak English increased from 48% to 59%.[5] Nationally, the proportion entering through the PNP increased from virtually zero in 2000 to 7% in 2010. This effect was strongest in Manitoba and Saskatchewan, where the shares entering via the PNP rose from 4% to 66% and from 0% to 49%, respectively.

The compositional shifts in immigrant characteristics and programs of entry may have been partly responsible for the decline in low-income rates over the 2000s, particularly among recent immigrants (in Canada for less than five years), the group on which this section focuses.

With a regression decomposition approach,[6] the extent to which the decline in the low-income rate was associated with changes in characteristics can be assessed—notably age, educational attainment, source region, knowledge of an official language and family status—or changes in

5. The proportion speaking French (without French as the mother tongue) rose only marginally.
6. Ordinary least squares regressions are run for Canada and each region (i.e., the provinces and the metropolitan areas) for 2000 and 2010, where the dependent variable is 1 if the recent immigrant is in low income, and 0 otherwise (i.e., a linear probability model). The independent variables include program of entry, age, educational attainment, knowledge of French and English, source region, and family status. Using the formula below, the overall change between the beginning and ending year (e.g., 2000 and 2010) in the low-income rate in the region can be decomposed into three terms: the overall change associated with changes in composition of recent immigrants (e.g., changes in the proportion with bachelor's degrees or entering under the PNP); the overall change associated with changes in the likelihood of being in low-income conditional on having a particular characteristic (e.g., the change in the likelihood of recent immigrants with a bachelor's degree or from a particular source region being in low-income); and a term indicating the 'joint change' (change that cannot be separated between the first two terms). The third term is typically small. The three terms are described algebraically as follows: $\beta_1 * (X_2 - X_1)$, $X_1 * (\beta_2 - \beta_1)$, $(X_2 - X_1) * (\beta_2 - \beta_1)$, where β_1 and β_2 are regression coefficients in time 1 and time 2, X_1 and X_2 are means of explanatory variables in time 1 and time 2.

the share entering the country under various programs[7]—including the PNP and FSWP, and as family class and refugees. The decomposition is carried out for Canada and its regions and cities, and for two time periods—1995 to 2000 and 2000 to 2010. This paper focuses on the latter period,[8] but briefly reports the results for 1995 to 2000.

During the economic expansion that occurred between 1995 and 2000, low-income rates among recent immigrants in Canada fell by 6.3 percentage points. The changing composition of recent immigrants contributed 1.9 points (or about 30%) of the decline. Changing education, age and family composition were the main factors underlying this composition effect (Table 2). During the 2000-to-2010 period particularly, of the 7.5-percentage-point decline in the low-income rate among recent immigrants in Canada, one-third (or 2.5 points) was associated with the changing composition of recent immigrants (Table 2). Rising educational attainment and changing source regions were the major contributors to the composition effect, together accounting for 1.7 of the 2.5-percentage-point drop associated with the compositional shift. Changing admission class did not have a large effect, accounting for only roughly 3% (0.2/7.5, Table 2) and at most 13%[9] of the total decline at the national level.

Changes in immigration selection varied by province during the 2000s, as these jurisdictions played a more active policy role than during previous periods. Some provinces embraced the PNP, others did not. Furthermore, immigrant landings moved somewhat away from Toronto and Vancouver towards other regions (Bonikowska, Hou and Picot 2014). As a result, changes in composition and immigrant class varied by region, as did their effect on low-income rates. Compositional changes accounted for between one-fifth and one-half of the decrease in low-income rates in the regions and cities, and the specific factors responsible for these compositional affects varied among jurisdictions.

In that regard, the three large cities remained the destination for most recent immigrants. In Toronto, low-income rates among recent immigrants did not fall over the 2000s. However, Montreal experienced a significant decline of 9.6 percentage points, half of which was associated with compositional changes. The most significant contributing factors included rising educational attainment levels and changes in admissions programs (Table 2), notably an increasing share of immigrants admitted via the FSWP, which increased from 39% to 57%. Furthermore, Vancouver saw a substantial 12.4-percentage-point drop in the low-income rates of recent immigrants, but only about 10% of it (1.2 points) was associated with compositional changes. In Vancouver, the share of immigrants entering through the federal skilled worker class fell from one-half to one-third and the shares entering through the family class and PNP rose. This shift in admission classes tended to put upward pressure on the low-income rate. However, this was offset by shifts in source region and rising educational attainment, which put downward pressure on the rate (Table 2). Overall, across the three largest immigrant-receiving cities, the effect of compositional changes on low-income rates varied significantly.

This variability was also evident across regions that saw larger immigrant in-flows through the 2000s. Saskatchewan posted the largest decline in low-income rates among recent immigrants (16.5 percentage points). About one-third of this appears to be associated with changing immigrant composition, driven primarily by shifts in source regions. Results for Manitoba are

7. The change in the type of entry programs can be thought of as the effect that exists after any differences in the characteristics of immigrants among programs (such as educational attainment, age, source region, etc.) are taken into account. Such a program effect might be related to differences in factors such as the share of immigrants who enter with a job in place, the link between the occupational skills of the entering immigrants and those in demand in the local economy, and the labour market network to which an immigrant has access after entering the country.
8. Much of the decline over the 1995-to-2000 period was likely related to the economic expansion during this phase of the business cycle. This is not the case over the 2000-to-2010 period, however. Other factors could be contributing significantly to the decline.
9. This estimate assumes that all of the 'joint change' is associated with a changing admission class, which is unlikely.

unclear because of the unusually large 'joint change,' which makes it impossible to separate the effects of changing admission categories from other factors.[10] Alberta and the Atlantic region also registered declines in low-income rates among recent immigrants. Compositional changes accounted for almost one-half of the decline in the Atlantic region, driven mainly by changes in admission class and source region, and for about one-third in Alberta, driven mainly by changes in admission class and rising educational attainment.

In summary, compositional changes—including changes in admission class and characteristics—did not play the dominant role in the decline in the low-income rates among recent immigrants over the 2000-to-2010 period, but played a significant part. The specific factors driving the compositional effect varied by region.

However, the decline in immigrant low-income rates may have contributed to the fall in the Canadian rates during the 2000s, just as they accounted for much of the rise in the 1990s.

2.4 The contribution of immigration to the decline in low-income rates in Canada during the 2000s

The direct effect of immigration on the aggregate low-income rate can be driven by two factors: a change in the share of immigrants in the population, and a change in their low-income rate. To determine a group's contribution to the change in the aggregate low-income rate in Canada or in a region, the following formula is used:

$$\%\, contribution = \left[r_{i,y2} * S_{i,y2} - r_{i,y1} * S_{i,y1} \right] * 100 / \left[R_{y2} - R_{y1} \right]$$

where $r_{i,y1}$ and $r_{i,y2}$ are the low-income rates for immigrant group i in year 1 and year 2, $S_{i,y1}$ and $S_{i,y2}$ are immigrant group i's shares of the population in the corresponding years, and R_{y1} and R_{y2} are the low-income rates for the population as a whole in year 1 and year 2.

The contribution of each group can be further decomposed into three components, namely: (1) the change in the group's low-income rates, $S_{i,y1} * \left[r_{i,y2} - r_{i,y1} \right] * 100 / \left[R_{y2} - R_{y1} \right]$; (2) the change in the group's population share, $r_{i,y1} * \left[S_{i,y2} - S_{i,y1} \right] * 100 / \left[R_{y2} - R_{y1} \right]$; (3) and the joint change in the group's low-income rates and population share $\left[S_{i,y2} - S_{i,y1} \right] * \left[r_{i,y2} - r_{i,y1} \right] * 100 / \left[R_{y2} - R_{y1} \right]$.

2.4.1 The effect of recent immigration on low-income rates

The low-income rates of recent immigrants are typically much higher than those of the Canadian-born, and hence a change in their population share can alter the overall rate. For that reason, the focus here is on recent immigrants.

The share of recent immigrants in the national population rose marginally through the 2000s, from 2.9% to 3.3%. However, there was considerable variability across regions and cities, with shares decreasing in Toronto and Vancouver but rising in Manitoba, Saskatchewan and Alberta (Table A.1).

10. The effect of changes in admission class are difficult to assess in such cases because in Manitoba, there is a very large 'joint effect,' and controls for educational attainment and other characteristics are in place, which means that the effect of any change in these characteristics associated with, for example, the introduction of the PNP, is excluded from the 'admissions class' effect and captured by the other characteristics.

At the national level, recent immigrants contributed very little to the overall decline in the low-income rate between 2000 and 2010, accounting for only 2% (Table A.2). Indeed, it was only in Vancouver that recent immigration played a significant role in the decline in low-income, accounting for about one-half of the 3.5-percentage-point decrease observed in that city. This effect was due to both declining low-income rates among recent immigrants and a decline in their share of the city's population. Interestingly, countervailing trends were evident in Manitoba. Although low-income rates declined significantly among recent immigrants in that province, putting downward pressure on the overall rate, the share of the provincial population comprised of recent immigrants increased considerably, putting upward pressure on the rate. The end result was that immigration pushed up the provincial low-income rate by only about 0.2 percentage points.

Nonetheless, looking at the national, regional or provincial and municipal levels, recent immigration generally had little to do with the decline in low-income rates observed over the 2000s. The same conclusion holds when one looks beyond recent immigrants and considers the effect of immigrants with 1 to 15 years of tenure in Canada. Using this broader categorization, immigration accounted for only 7% of the decline in the national low-income rate over the 2000s, and for virtually none of the decline between 1995 and 2000. Likewise, immigration had little direct effect on low-income rates in most regions. Again, however, the major exception was Vancouver, where three-quarters of the decline in the low-income rate over the 2000s was associated with both falling low-income rates among immigrants and their declining share of the population. Montreal witnessed a similar but much-less dramatic pattern, with immigration accounting for about 15% of the 2.9-percentage-point decline in that city's low-income rate.

3 Immigration and high-income rates in Canada

A focus on income inequality, the ultimate goal of this paper, requires an analysis of changes across the entire income distribution, not just the bottom. In recent years there has been much debate regarding the increased concentration of income at the top of the distribution. This section concentrates on the top of the income distribution. It mirrors the low-income analysis presented in the previous section. The high-income cutoff used here is twice the median adult-equivalent-adjusted income. The median is the average observed over the years 1995, 2000, 2005 and 2010. The high-income cutoff is held fixed over time, so the analysis uses a fixed (not relative) high-income cutoff.

The proportion of population in Canada with "high family income"[11] rose rapidly between 1995 and 2010, from 6.7% to 16.1% (Table 3). This increase was observed among immigrants as well. Along with a declining share in "low income" as noted in the previous section, a rising share of immigrants found themselves with high income. This suggests a shift to the right in the income distribution among all groups, immigrants as well as the Canadian-born. Charts A.1 and A.2 (Appendix A) demonstrate this shift between 2000 and 2010. These charts also indicate the higher share of immigrants than Canadian-born in "low income" and a lower share with high income, particularly among the recent immigrants.

Not surprisingly, the high-income rate among immigrants, while increasing, is much lower than among the Canadian-born. In 2010, 4.6% of "recent" immigrants made it into the high-income category, compared to 9.6% of immigrants in Canada for 11 to 15 years, and 17% of the Canadian-born.[12]

11. Adult-equivalent-adjusted.
12. The Canadian-born plus immigrants in Canada for more than 15 years.

Just as the last section examined whether immigration contributed to the decline in the Canada-wide low-income rate during the 2000s, this section examines whether immigration contributed to the increase in the high-income rate observed between 1995 and 2010. Immigrants could affect this rate either because their share of the population was declining, or because their high-income rates were increasing at a faster rate than that of the Canadian-born. Table 3 suggests that neither of these events occurred. The same method as in the previous section on low income is used to determine the contribution of immigration to the rise in the high-income rate. Just as in the last section, immigration contributed little to the increase. Only from 1% to 2% of the increase in the high-income rate can be ascribed to changes in the immigrant population.

The trend in the "high-income" rate in Canada, as measured here, was very similar between the immigrant and Canadian-born population between 1995 and 2010, although more Canadian-born found themselves in that category.

Table 3

High-income rates[1] by immigration status, 1995 to 2010

	High-income rate				Group contribution to the change in national high-income rates	
	1995	2000	2005	2010	1995 to 2000	2000 to 2010
	percent					
All	6.7	9.7	12.9	16.1	...	...
Immigrants for 1 to 5 years	1.4	3.0	3.2	4.6	1.1	1.0
Immigrants for 5 to 10 years	2.7	3.8	5.6	7.3	2.4	1.5
Immigrants for 11 to 15 years	4.7	6.5	6.4	9.6	1.6	2.0
Long-term immigrants and the Canadian-born	7.0	10.2	13.7	17.0	94.9	95.4

... not applicable

1. Based on family income, adult-equivalent-adjusted.

Source: Statistics Canada, Longitudinal Administrative Databank.

4 Immigration and family-income inequality

4.1 Recent trends in family-income inequality in Canada

To assess the effect of immigration on income inequality, inequality trends in Canada are first reviewed. A number of recent papers have addressed the issue of family-income inequality in Canada. Fortin et al. (2012) and Frenette, Green and Milligan (2007) focus on overall inequality, while Veall (2012) concentrates on changes at the top of the income distribution. These papers report income inequality trends and discuss possible explanations and policy implications.

Based on the survey data reported by Statistics Canada, family-income inequality as measured by the Gini coefficient fell marginally during the 1980s, increased significantly during the 1990s—mostly during the last half of the decade—and changed little during the 2000s (Chart 4).[13] Frenette, Green and Milligan (2007) stress the role of the tax-transfer system in preventing the rise in income inequality during the 1980s in the face of rising market earnings inequality. But the tax-transfer system could not repeat this feat in the 1990s, and family-income

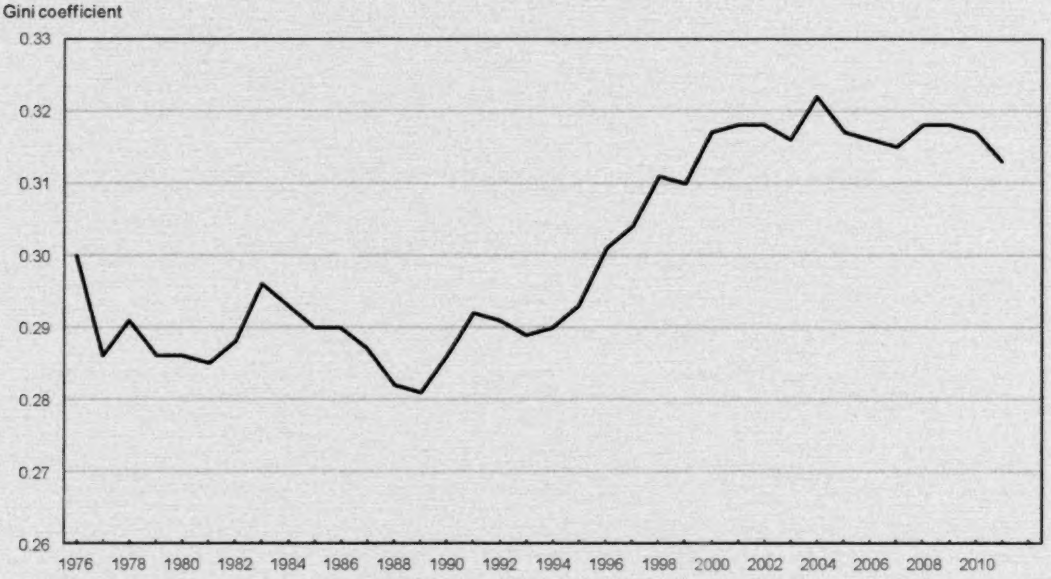
13. Based on the Gini coefficient using after-tax, after-transfer income of individuals, where each individual is represented by their "adult-equivalent-adjusted" household income. The Gini coefficient is a commonly used measure of how income is evenly distributed within a population. Its value varies between 0 when every person has the same income to 1 when one person has all the income while all others have none.

inequality rose under the pressure of rising market earnings inequality. Nonetheless, the inequality-reducing effect of the tax-transfer system was greater in 2000 than in the 1980s.

Moore and Pacey (2003) examine the direct effect of immigration on family-income inequality. Based on their findings, it was estimated that approximately one-half of the quite small increase in inequality over the 1980-to-1995 period was associated with immigration. Most of this effect was observed in the 1990-to-1995 period.

This analysis focuses on the period between 1995 and 2010 using taxation data. Adult-equivalent-adjusted[14] after-tax family income is used to assess income inequality. Family income is 'adult-equivalent-adjusted' to account for differences in family size among groups. The individual is the unit of analysis, since the adult-equivalent income is really a measure of the economic resources available to each individual in the family (a per capita measure). This measure of family income is ascribed to each member of the family. In calculating income inequality, the adult-equivalent-adjusted income is top-coded at $1,000,000.[15]

Chart 4
Family-income inequality in Canada, Gini coefficient, 1976 to 2011



Note: Gini coefficient based on after-tax, after-transfer income of individuals. Each individual is represented by adult-equivalent-adjusted family income.

Source: Statistics Canada, CANSIM table 202-0709 (based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics).

Are taxation data representative of overall trends? Just as with low-income data, different data sources provide different levels of inequality, but the trends are quite similar. Inequality levels

14. Adult-equivalent-adjusted family income is derived as total family income divided by the square root of the family size.
15. The top coding is done to reduce the influence of a few extreme values on the inequality index for small population groups. As Table A.3 (Appendix A) shows, the CV^2 is the most sensitive to the top coding, while the mean log deviation is the least sensitive. Moving from no top coding to top coding at $1 million (adjusted income) significantly reduces the increase in inequality between 1995 and 2010 as measured by the CV^2, but has relatively little effect on the trends as measured by the three other indexes (Table A.3). Setting the top coding to lower values does not affect the trends in income inequality.

tend to be higher in census and taxation data than in survey data,[16] mainly because surveys tend to miss some low and high incomes reported in both taxation and census data (Frenette, Green and Picot 2004; Frenette, Green and Milligan 2007). This results in lower inequality levels in the survey data.

But the trends examined in this study over the 1995-to-2010 period are very similar to those in the taxation and survey data (Table 4). According to the after-tax income in survey data, most of the increase observed over the three decades occurs between 1995 and 2000. Of the 0.031-point increase in the Gini observed in the survey data between 1980 and 2010, 0.024 points, or about three-quarters of it, occurred between 1995 and 2000. The taxation data show a similar 0.025-point increase during this period, while the census data with estimated after-tax income[17] show very little increase. Income inequality typically rises in recessions, as it did in the early 1980s and 1990s, and therefore might be expected to fall in economic expansions. But this did not occur in the late 1990s' expansion, and this period instead displayed the largest rise income inequality in the past three decades. Between 2000 and 2010, the survey data show no increase in the Gini, and the taxation data only display a small 0.004-point rise. Comparable data from the census are not available for this period. Overall, the trends over the 2000s observed in the taxation data (used here) and the survey data are very similar.

Table 4
Family-income inequality, after-tax data, Gini coefficient, Canada

	Census data	Taxation data[1]	Survey data
		Gini coefficient	
1980	0.308	..	0.286
1985	0.314	..	0.290
1990	0.307	..	0.286
1995	0.319	0.343	0.293
2000	0.322	0.368	0.317
2005	..	0.374	0.317
2010	..	0.372	0.317

.. not available for a specific reference period

1. Authors' calculations based on taxation data from the source mentioned below.

Note: In all cases the unit of analysis is the individual, with the adult-equivalent-adjusted family income assigned to each individual in the family.

Sources: M. Frenette, D. Green, and K. Milligan. 2007. "The tale of the tails: Canadian income inequality in the 1980s and 1990s." *Canadian Journal of Economics* 40 (3): 734–764 (for census data); Statistics Canada, Longitudinal Administative Databank, 1995 to 2010 (for taxation data), and CANSIM table 202-0709 (based on the Survey of Consumer Finances and the Survey of Labour and Income Dynamics) (for survey data).

4.2 Inequality among the immigrant population

There are two basic findings regarding income inequality among immigrants that are germane to this analysis. First, levels of inequality tend to be marginally higher among the immigrant population than among the Canadian-born.[18] For example, in 2010, the Gini was 0.362 among the comparison group (mostly Canadian-born), and between 0.384 and 0.387 among immigrants in Canada for 1 to 15 years (Appendix Table A.4). This means that any increase in the immigrant's share of the population will exert upward pressure on family-income inequality

16. Survey of Consumer Finances and Survey of Labour and Income Dynamics.
17. The census at that time collected only before-tax income data. Regression estimates were used to estimate after-tax income (Frenette, Green and Milligan 2007).
18. This does not apply to all regions. In Toronto, Manitoba and Saskatchewan inequality is lower among immigrants.

overall. Second, inequality among immigrants increased over the 1995-to-2000 period, just as it did for the Canadian-born. Similar to the trend among the Canadian-born, most of this increase was during the 1995-to-2000 period (Table A.4). This suggests that whatever pressures increased inequality among the Canadian-born may have also been applied to the immigrant population.

4.3 Assessing immigrant contribution to changing aggregate family-income inequality

Any group may have a direct effect on rising aggregate inequality for three possible reasons: (1) the level of inequality within the group may rise; (2) the level of income inequality among groups may rise;[19] or (3) a group's share of the population may increase, and if that group's level of inequality is above-average, as it often is for recent immigrants, this will contribute to rising inequality. In the analysis, the total population is divided into four groups: (1) the Canadian-born plus long-term immigrants;[20] (2) immigrants in Canada for 5 years or less (recent immigrants); (3) immigrants in Canada for 6 to 10 years; and (4) immigrants in Canada for 11 to 15 years.

The selected income indexes are decomposed to answer two questions. First, to what extent did each group contribute to the rise in family-income inequality in Canada over the reference period? And second, to what extent was this contribution due to (a) increasing inequality within the group; (b) the group's rising share of the total population; and (c) increased inequality among groups (i.e., increased difference in mean family incomes among groups)?

While the Gini coefficient is the most commonly used inequality index, there are many others. In this analysis three decomposable indexes of inequality are used: the squared coefficient of variation (CV^2), the Theil, and the mean log deviation (Allison 1978; Jenkins 1999). More than one index is used because the value of some indexes are susceptible to movements at the top of the income distribution, while others are affected more by changes in income at the bottom. Such measures are taken to ensure that the findings are robust across the entire income distribution. The CV^2 is affected more by income movements at the top of the distribution, where much of the action has been located over the past couple of decades. While both the mean log deviation and the Theil indexes are sensitive to changes at the lower end of income distribution, the mean log deviation is more so (Allison 1978; Jenkins 1999).

The change in inequality is decomposed as measured by CV^2, Theil and the mean log deviation over the 1995-to-2000 and the 2000-to-2010 periods. The focus is on the 1995-to-2000 period, since inequality increased most during this period. An algebraic description of this decomposition technique is presented in Appendix B.

Using these three decomposable indexes, the result of the analysis is straightforward, and all three indexes provide similar answers (Tables A.5, A.6, and A.7). Over the 1995-to-2000 period, during which most of the rise in inequality in Canada was concentrated, very little of the increase was associated with immigrant groups. Virtually all of the increase was due to increasing inequality within the comparison group (mostly Canadian-born).

For instance, inequality as measured by Theil index rose from 0.214 to 0.256 for the total population between 1995 and 2000, and remained more or less constant to 2010 at that level (Table A.4). Thus, the 0.042 change in the index value is decomposed. While the share of immigrants (with less than 15 years tenure) increased from 7.2% to 8.2%, the difference in inequality between immigrants and the Canadian-born was not sufficient to result in a major

19. Inequality among groups is measured using the average adult-equivalent-adjusted family income for each group.
20. This refers to immigrants who stayed in Canada for 16 years or more. Longer-term immigrants resemble the Canadian-born in many ways, including their income patterns.

contribution. The increase in the share of immigrants accounted for only 0.001 of the 0.042 increase. The rise in inequality within the immigrant groups accounted for 0.002 of the total increase, while the change in between-group inequality contributed virtually nothing to the change (Table A.6). Overall, the immigrant groups accounted for about 0.002 of the 0.042 rise, or about 5%. This is about what might be expected since these immigrant groups accounted for about 7% of the population. They did not disproportionately contribute to the rise in inequality.

When the same analysis is conducted using the CV^2 index, immigrant groups accounted for about 4% of the increase in inequality (Table A.5). Immigrants' contribution to the change in the mean log deviation was larger than the changes in the other two indexes, about 26% (Table A.7). This is likely because the mean log deviation is most sensitive to changes in the bottom income distributions where immigrants are more likely to be concentrated.

Using all three indexes, the vast majority—between 88% and 97%—of the increase in inequality from 1995 to 2000 was associated with the rising inequality within the comparison group, which includes the Canadian-born and longer-tenured immigrants. This is also what might be expected since they accounted for the majority of the population.

But this result may not hold for all regions. In cities where immigrants constitute a large share of the population, did immigrants account for a disproportionately large share of the rise in income inequality in the late 1990s?

The Theil index was used to examine regional differences. In Toronto, the rise in inequality between 1995 and 2000 was somewhat larger than for Canada as a whole, increasing 0.072 points, or about 28%, compared to 20% for Canada. Virtually none of this increase was associated with the immigrant population, and fully 97% by rising inequality within the Canadian-born population (Table A.6). A similar story holds for Vancouver, where none of the rise in the 0.055-point increase in inequality (or 22%) was concentrated among the immigrant groups. Results are similar for Montreal, which experienced a much smaller increase of only 0.020 points (or 9%) in inequality.

5 Immigration and family-earnings inequality

The tax and transfer system both reduce inequality at any given point and time, and can potentially affect inequality trends over time. This was observed in the 1980s, for example, when earnings inequality was rising, but after the tax and transfer system redistributed some income, after-tax, after-transfer income inequality changed little. It may be that *earnings-based* inequality trends—before taxes and transfers—in Canada have been affected by immigration, even if such an effect is not observed when income is measured post tax and transfer, as in the previous section. To determine if this is the case, we replicate some of the previous sections analysis using family earnings, rather than after-tax, after-transfer family income.

As with family-income inequality, and based on the Gini, family-earnings inequality rose between 1995 and 2010, and most of the increase occurred during the late 1990s, although it increased marginally in the early 2000s. The family-earnings Gini for Canadians with positive family earnings rose from 0.420 in 1995 to 0.439 in 2000, and then to 0.447 in 2005. The other three indexes (the log deviation, Theil and CV^2) tell a similar story; most of the increase occurred in the late 1990s, with some rise in the early 2000s.

Family-earnings inequality also rose among the immigrant population in Canada for less than 15 years, but the rise was observed more equally between the late 1990s and early 2000s. Little increase was observed in the late 2000s.

Did immigration contribute to the rise in family-earnings inequality in Canada? The answer is essentially no. The study's focus is on the Theil index, the one used most often in the previous section. The Theil index increased from 0.324 in 1995 to 0.371 in 2000, an increase of 0.047. Of this increase, only 0.002 (or about 4%) is ascribed to changes in the immigrant population. These changes could include a rise in between-group inequality, a rise in within-group inequality or a change in immigrants' share of the population. None of these possibilities occurred to a sufficient degree to significantly affect family-earnings inequality in Canada. Similarly, over the 2000-to-2010 period, when there was a much smaller increase of 0.007 in the Theil index, immigration accounted for none of this very small increase.

6 The indirect effect of immigration on wage inequality

As noted in the introduction, increasing shares of immigrants can potentially affect the wages of the Canadian-born. This effect can vary across the wage distribution, thereby affecting wage inequality. The international literature suggests that the effect of immigration on wages can be positive or negative, but, in general, it is very small (Kerr and Kerr 2011; Longi, Nijkamp and Poot 2006, 2009; Okkerse 2008; European Economic Association 2012). But this effect can vary among countries depending on the type of immigrants entering the country, notably their occupational skills and education, and the country's industrial structure.

In Canada, few papers have addressed this issue. Aydemir and Borjas (2007) find a negative effect of immigration on the wages of the Canadian-born. Overall a 10% immigration-induced increase in the labour supply, which is a very large supply increase, reduces wages of the Canadian-born by 3% to 4%. Immigration increases labour supply by perhaps 0.7% to 0.8% per year in Canada, which might reduce wages of the Canadian-born by around 0.3% according to this study. The negative wage effect is greater among the more highly educated since the immigration-induced labour supply increase is concentrated among this education group. Hence, Aydemir and Borjas conclude that by negatively affecting the wages of highly educated Canadians more than the less-educated (where the immigration effect may raise wages), immigration tended to reduce wage inequality.[21]

But by how much? Between 1980 and 2000, wages fell by 2.2% among university graduates and by 16.2% among high school graduates (Table 4 in Aydemir and Borjas 2007). Hence, wage inequality rose across education groups; between-group inequality increased. Using the results from a series of simulations that Aydemir and Borjas produce, one can roughly estimate the wage change that might have occurred over the 20-year period in the absence of immigration. Wages among the highly educated would have increased by 4% to 8% (instead of a 2% decrease), and among high school graduates it would have fallen by 17% to 20% (rather than 16%). Hence, in the absence of immigration, the income gap between the more- and less-educated would have increased more than it did, and inequality across education groups would have risen more than what was actually observed. In short, immigration might have reduced between-group inequality somewhat. But it is important to remember that changes in overall inequality are also determined by within-group inequality. Within-group inequality among the highly educated Canadian-born could increase if immigration effects were concentrated among those who were located near the bottom of the within-group income distribution. This outcome seems quite possible, since, on average, better-educated immigrants earn less than their non-immigrant counterparts, and hence may compete more with non-immigrants at the bottom of the within-group wage distribution. This possible increase in within-group inequality could offset to some unknown extent the immigration effect that results in a decline in between-group

21. One assumption of their analytical approach is that well educated immigrants compete in the same labour markets as well educated native-born workers. This assumption is problematic, particularly for recent immigrants (Dustmann and Preston 2012; Dustmann, Frattini and Preston 2013). This assumption is relaxed in Dustmann and Preston (2012).

inequality, and may lead to a small total indirect effect of immigration on income inequality among the Canadian-born. Thus, it seems likely that the kinds of effects found by Aydemir and Borjas would have had some effect, but not a large indirect effect on total wage inequality.

Tu (2010) used a methodology similar to that of Aydemir and Borjas, but applied it at both a national and sub-national level, and over a different time period (the 1990s). He finds no evidence of a negative effect of immigration on the wages of the Canadian-born, and in some specifications, a small positive effect. The zero or small effects found by Tu would have small effects on wage inequality.

Card (2009) provides an in-depth examination of the immigration effect on the wage distribution of the native-born in the United States (referred to here as the indirect effect of immigration). He notes that the answer depends on a number of factors, including the extent to which immigrants and the native-born with similar education levels are perfect substitutes and hence are competing directly with one another. Card (2009) and a number of other papers (Ottaviano and Peri 2012; Manacorda, Manning and Wadsworth 2012) determine that immigrants and the native-born are imperfect substitutes, and that new immigrants, in particular, likely compete more with other immigrants, especially the recently arrived, than with the native-born. Hence, immigration-induced wage effects may be more evident among other immigrants than among native-born workers.

Overall, Card concludes that in the United States the effect of immigration on native-born wage inequality is very small. Card argues that if the educational distributions of immigrants and the native-born are similar, there will be little effect. Accordingly, the immigration effect may be larger in Canada because educational distributions of immigrants and the native-born are more dissimilar in Canada than the United States—immigrants are more highly educated in Canada, and less-educated than the native-born in the United States.[22] Hence the downward pressure is more likely on the wages of the highly educated in Canada, since immigrants are overrepresented among this group. However, on balance, given the international and Canadian evidence, Card's general conclusion likely applies to Canada as well, although additional research is needed to reach a more definitive conclusion.

7 Conclusion

This paper asks if immigration contributed to the decline in low-income rates in Canada during the 2000-to-2010 period. Low-income rates among immigrants declined over the 2000s, although their relative (to the Canadian-born) low-income rates did not improve. There was little progress in reversing the significant run-up in relative low-income ratios during the 1980s and 1990s. There were three regional exceptions to this general pattern: immigrant low-income rates did not fall in Toronto as in other regions during the 2000s (nor did rates among the Canadian-born), and rates among immigrants declined the fastest in Manitoba and Saskatchewan, where relative rates among recent immigrants fell back to around 1.2 times that of the Canadian-born, levels of relative rates not seen since the early 1980s.

Policies and practices regarding immigrant selection changed significantly during the 2000s, with the introduction of the *Immigration and Refugee Protection Act* in 2002, and the expansion of the Provincial Nominee Program (PNP) in Manitoba and Saskatchewan. These and other changes altered both the characteristics of entering immigrants and the programs of entry (i.e., immigrant class). These changes tended to increase entry earnings, and may have

22. Card (2009) states that 36% of immigrants have a college-equivalent education in the United States, compared to 41% of the American-born. Using somewhat different educational classifications, the 2006 Census indicates that among 20- to 65-year-olds, 20.4% of the Canadian-born have a university degree compared to 31.4% of immigrants in Canada.

contributed to the fall in low-income rates observed among recent immigrants (in Canada for less than five years). This paper concludes that, at the national level, changes in immigrant characteristics—notably rising educational attainment and changing source regions—accounted for about one-third of the decline in the low-income rate among recent immigrants (in Canada five years or less) during the 2000s. Changing admission class did not have a significant effect nationally. At the regional level, changes in selection policies and practices over the 2000s varied tremendously as some provinces embraced the PNP more than others. Furthermore, the change in the number of recent immigrants in the population also varied by region due to a decentralization of entering immigrants away from Toronto towards the western regions in particular. As a result, the effect of compositional changes also differed by province. Changes in immigrant characteristics and entry program accounted for between one-fifth and one-half of the decrease in low-income rates among recent immigrants depending on the region.

Declining immigrant low-income rates contributed little to the fall in low-income rates among the general population in Canada during the 2000s. Unlike the 1990s, when rising immigrant shares and rates accounted for most of the increase in low-income rates in Canada, the decrease in the rates during the 2000s was driven primarily by falling rates among the Canadian-born. The only exception was Vancouver, where three-quarters of the decline in the city's low-income rates was associated with both rapidly falling rates among immigrants and their declining share of the population.

Family-income inequality increased in Canada from 1990 to 2010, but the majority of the rise occurred during the late 1990s. Using three decomposable inequality indexes, the paper concludes that, for Canada as a whole, immigration contributed little to the increase of the late 1990s. This null result held for the three largest cities as well. Family-income inequality rose among the immigrant population during the late 1990s, as it did among the Canadian-born, but the immigrant population did not contribute disproportionately to the overall increase. There was little increase in family-income inequality in the 2000s.

A rising immigrant share of the population could also affect the wages and wage distribution of the Canadian-born. The international literature tends to suggest that the effect is generally small, whether positive or negative. If this immigration effect varies across the earnings distribution, then it can also indirectly change earnings inequality among the Canadian-born, and hence low-income rates and family-income inequality. While no original research is presented in this paper, a review of the extensive international literature along with the few Canadian papers that address this issue suggests that this effect is likely small.

Appendix A: Tables

Table A.1-1

Low-income rates and population shares by immigration status — Canada, Altantic region, Quebec, Ontario, Manitoba and Saskatchewan

	Low-income rate				Share in the total population			
	1995	2000	2005	2010	1995	2000	2005	2010
	percent							
Canada								
All	20.1	18.1	15.5	13.9	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	45.7	39.4	37.5	31.9	3.5	2.9	3.2	3.3
Immigrants for 5 to 10 years	35.5	35.1	32.3	27.3	2.0	3.4	2.8	3.1
Immigrants for 11 to 15 years	27.5	26.6	27.7	24.2	1.7	2.0	3.3	2.7
Long-term immigrants and the Canadian-born	18.6	16.7	13.8	12.5	92.8	91.8	90.8	90.9
Atlantic region								
All	18.4	16.2	13.0	10.2	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	40.2	38.9	30.8	28.8	0.4	0.3	0.4	0.7
Immigrants for 5 to 10 years	23.0	31.2	27.9	21.7	0.3	0.3	0.3	0.4
Immigrants for 11 to 15 years	18.3	23.1	23.3	22.0	0.3	0.2	0.3	0.3
Long-term immigrants and the Canadian-born	18.3	16.1	12.8	10.0	99.1	99.2	99.0	98.7
Quebec								
All	18.9	15.7	13.0	11.5	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	51.8	41.5	38.4	31.3	2.1	1.4	2.1	2.3
Immigrants for 5 to 10 years	42.9	38.5	30.8	23.9	1.1	1.9	1.4	1.9
Immigrants for 11 to 15 years	34.5	31.9	28.4	23.6	1.0	1.1	1.8	1.3
Long-term immigrants and the Canadian-born	17.8	14.7	11.9	10.6	95.8	95.6	94.7	94.4
Ontario								
All	19.6	18.3	17.0	16.2	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	47.4	39.7	40.9	38.8	5.2	4.2	4.6	4.0
Immigrants for 5 to 10 years	34.9	34.6	33.7	31.4	3.2	5.0	4.1	4.5
Immigrants for 11 to 15 years	27.7	26.2	29.0	26.7	2.2	3.1	4.8	4.0
Long-term immigrants and the Canadian-born	17.3	16.1	14.2	13.9	89.5	87.6	86.4	87.6
Manitoba								
All	19.4	17.4	15.5	13.6	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	36.2	27.8	23.3	16.3	1.6	1.2	1.8	3.5
Immigrants for 5 to 10 years	28.5	22.5	20.0	15.4	1.3	1.5	1.1	1.7
Immigrants for 11 to 15 years	20.2	18.5	16.8	12.8	1.4	1.2	1.4	1.0
Long-term immigrants and the Canadian-born	18.9	17.2	15.3	13.4	95.8	96.1	95.6	93.8
Saskatchewan								
All	20.7	19.3	16.3	11.8	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	37.7	31.2	29.2	14.7	0.6	0.5	0.6	1.8
Immigrants for 5 to 10 years	30.7	30.4	21.9	21.2	0.4	0.5	0.5	0.8
Immigrants for 11 to 15 years	23.3	27.3	24.0	15.5	0.5	0.3	0.5	0.5
Long-term immigrants and the Canadian-born	20.6	19.1	16.1	11.7	98.5	98.6	98.4	96.9

Note: Percentages for shares in the total population may not add up to 100.0% because of rounding.

Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.1-2
Low-income rates and population shares by immigration status — Alberta, British Columbia, Montréal, Toronto and Vancouver

	Low-income rate				Share in the total population			
	1995	2000	2005	2010	1995	2000	2005	2010
	percent							
Alberta								
All	22.9	19.3	14.4	12.6	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	50.1	36.5	28.8	22.1	2.7	2.0	2.6	3.6
Immigrants for 5 to 10 years	41.2	34.1	26.4	20.7	1.7	2.5	2.0	3.0
Immigrants for 11 to 15 years	29.5	28.7	23.6	19.8	2.1	1.6	2.4	2.0
Long-term immigrants and the Canadian-born	21.7	18.4	13.5	11.8	93.6	93.9	93.0	91.4
British Columbia								
All	20.3	21.0	18.3	16.4	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	45.4	46.6	40.8	33.2	5.7	4.9	4.1	4.3
Immigrants for 5 to 10 years	36.6	41.8	39.0	32.0	2.6	5.3	4.7	3.9
Immigrants for 11 to 15 years	26.6	31.6	34.0	28.6	2.3	2.5	4.9	4.4
Long-term immigrants and the Canadian-born	18.1	18.0	15.2	14.3	89.5	87.3	86.3	87.4
Montréal								
All	20.4	16.6	14.9	13.7	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	53.9	42.7	40.5	33.0	4.2	2.7	3.9	4.2
Immigrants for 5 to 10 years	44.8	38.8	32.8	24.9	2.2	3.7	2.6	3.4
Immigrants for 11 to 15 years	36.5	32.2	29.7	24.9	2.0	2.1	3.6	2.4
Long-term immigrants and the Canadian-born	17.9	14.5	12.7	12.1	91.6	91.5	90.0	90.0
Toronto								
All	21.1	18.9	19.4	18.9	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	46.8	39.0	40.5	38.5	10.4	8.4	8.9	7.4
Immigrants for 5 to 10 years	34.7	33.2	33.6	30.6	6.1	9.8	7.9	8.2
Immigrants for 11 to 15 years	28.5	24.8	28.5	26.1	4.0	5.7	9.1	7.4
Long-term immigrants and the Canadian-born	16.3	14.4	14.2	15.0	79.5	76.1	74.1	77.1
Vancouver								
All	21.2	22.1	20.7	18.6	100.0	100.0	100.0	100.0
Immigrants for 1 to 5 years	47.2	48.0	43.0	35.6	10.2	8.7	6.9	7.0
Immigrants for 5 to 10 years	37.5	42.6	40.5	33.1	4.3	9.2	8.1	6.4
Immigrants for 11 to 15 years	27.6	31.8	35.4	29.3	3.6	4.1	8.4	7.4
Long-term immigrants and the Canadian-born	16.9	16.3	15.0	15.0	82.0	78.1	76.6	79.2

Note: Percentages for shares in the total population may not add up to 100.0% because of rounding.

Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.2-1
Contribution to the changes in the aggregate low-income rates in Canada, provinces and major metropolitan areas — Canada, Atlantic region, Quebec, Ontario, Manitoba and Saskatchewan

	1995 to 2000				2000 to 2010			
		Components				Components		
	Total	Rate	Proportion	Joint changes	Total	Rate	Proportion	Joint changes
	percent							
Canada								
Immigrants for 1 to 5 years	25	11	16	-2	2	5	-4	1
Immigrants for 5 to 10 years	-24	0	-24	0	8	6	2	-1
Immigrants for 11 to 15 years	-3	1	-4	0	-3	1	-5	0
Long-term immigrants and the Canadian-born	102	94	9	-1	93	90	3	-1
Atlantic region								
Immigrants for 1 to 5 years	1	0	1	0	-1	1	-2	1
Immigrants for 5 to 10 years	-2	-1	-1	0	0	0	0	0
Immigrants for 11 to 15 years	0	-1	0	0	0	0	0	0
Long-term immigrants and the Canadian-born	101	101	0	0	101	100	1	0
Quebec								
Immigrants for 1 to 5 years	15	7	10	-2	-3	3	-9	2
Immigrants for 5 to 10 years	-8	2	-10	1	6	6	0	0
Immigrants for 11 to 15 years	0	1	-1	0	1	2	-2	0
Long-term immigrants and the Canadian-born	93	92	1	0	96	93	4	-1
Ontario								
Immigrants for 1 to 5 years	59	31	34	-6	6	2	5	0
Immigrants for 5 to 10 years	-49	1	-51	0	17	8	10	-1
Immigrants for 11 to 15 years	-15	2	-19	1	-12	-1	-12	0
Long-term immigrants and the Canadian-born	105	83	24	-2	90	89	1	0
Manitoba								
Immigrants for 1 to 5 years	12	7	7	-2	-6	4	-17	7
Immigrants for 5 to 10 years	2	4	-3	1	2	3	-2	1
Immigrants for 11 to 15 years	3	1	2	0	2	2	1	0
Long-term immigrants and the Canadian-born	83	87	-4	0	102	94	11	-2
Saskatchewan								
Immigrants for 1 to 5 years	6	3	4	-1	-1	1	-6	3
Immigrants for 5 to 10 years	-4	0	-4	0	0	1	-1	0
Immigrants for 11 to 15 years	2	-1	3	1	0	1	-1	0
Long-term immigrants and the Canadian-born	96	98	-2	0	101	99	4	-2

Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.2-2
Contribution to the changes in the aggregate low-income rates in Canada, provinces and major metropolitan areas — Alberta, British Columbia, Montréal, Toronto and Vancouver

	1995 to 2000				2000 to 2010			
		Components				Components		
	Total	Rate	Proportion	Joint changes	Total	Rate	Proportion	Joint changes
	percent							
Alberta								
Immigrants for 1 to 5 years	17	10	9	-3	-1	4	-8	3
Immigrants for 5 to 10 years	-5	3	-10	2	3	5	-3	1
Immigrants for 11 to 15 years	5	0	4	0	1	2	-2	1
Long-term immigrants and the Canadian-born	83	85	-2	0	97	92	7	-2
British Columbia								
Immigrants for 1 to 5 years	-38	9	-46	-1	19	14	6	-2
Immigrants for 5 to 10 years	174	18	137	19	21	11	13	-3
Immigrants for 11 to 15 years	24	16	7	1	-10	2	-13	1
Long-term immigrants and the Canadian-born	-60	-6	-54	0	70	70	-1	0
Montréal								
Immigrants for 1 to 5 years	29	12	21	-4	-8	9	-22	5
Immigrants for 5 to 10 years	-11	4	-17	2	20	18	3	-1
Immigrants for 11 to 15 years	2	2	-1	0	2	5	-4	1
Long-term immigrants and the Canadian-born	81	81	0	0	85	79	8	-1
Toronto								
Immigrants for 1 to 5 years	74	38	43	-7				
Immigrants for 5 to 10 years	-52	4	-59	2				
Immigrants for 11 to 15 years	-14	7	-23	3				
Long-term immigrants and the Canadian-born	92	69	26	-3				
Vancouver								
Immigrants for 1 to 5 years	-74	9	-82	-1	48	31	23	-6
Immigrants for 5 to 10 years	265	25	211	29	51	25	34	-8
Immigrants for 11 to 15 years	35	17	15	2	-25	3	-30	2
Long-term immigrants and the Canadian-born	-126	-54	-75	3	25	30	-5	0

Note: Since a decomposition was not performed in cases where there were no changes in low-income rates, some data cells have been left blank.

Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.3
The sensitivity of income inequality indexes to top coding

	1995	2000	2010	1995	2000	2010	1995	2000	2010	1995	2000	2010
	squared coefficient of variation			Gini coefficient			Theil index			mean log deviation		
No top coding												
All	0.935	2.080	1.665	0.343	0.368	0.372	0.221	0.286	0.281	0.242	0.281	0.281
Immigrants for 1 to 5 years	0.726	4.266	1.471	0.367	0.400	0.389	0.246	0.338	0.293	0.312	0.367	0.343
Immigrants for 5 to 10 years	0.781	1.439	0.912	0.364	0.390	0.387	0.240	0.289	0.269	0.303	0.360	0.362
Immigrants for 11 to 15 years	0.718	1.230	1.012	0.353	0.375	0.386	0.227	0.271	0.272	0.260	0.308	0.339
Long-term immigrants and the Canadian-born	0.928	2.053	1.666	0.338	0.364	0.367	0.215	0.280	0.276	0.232	0.270	0.269
Top coded at $1,000,000												
All	0.635	0.909	0.848	0.342	0.363	0.368	0.214	0.256	0.256	0.240	0.274	0.275
Immigrants for 1 to 5 years	0.682	1.006	0.848	0.367	0.394	0.387	0.245	0.291	0.277	0.312	0.357	0.339
Immigrants for 5 to 10 years	0.625	0.831	0.671	0.363	0.388	0.386	0.235	0.275	0.263	0.302	0.357	0.360
Immigrants for 11 to 15 years	0.648	0.811	0.730	0.353	0.373	0.384	0.224	0.256	0.262	0.260	0.304	0.336
Long-term immigrants and the Canadian-born	0.622	0.896	0.835	0.337	0.358	0.362	0.208	0.250	0.250	0.230	0.262	0.262
Top coded at $500,000												
All	0.552	0.698	0.675	0.340	0.359	0.364	0.207	0.239	0.241	0.238	0.268	0.269
Immigrants for 1 to 5 years	0.634	0.781	0.732	0.366	0.392	0.386	0.242	0.278	0.270	0.311	0.353	0.337
Immigrants for 5 to 10 years	0.582	0.702	0.622	0.363	0.386	0.385	0.233	0.268	0.260	0.301	0.354	0.359
Immigrants for 11 to 15 years	0.581	0.670	0.635	0.352	0.370	0.383	0.220	0.247	0.256	0.258	0.301	0.334
Long-term immigrants and the Canadian-born	0.538	0.684	0.660	0.335	0.354	0.358	0.202	0.233	0.234	0.228	0.256	0.256
Top coded at $300,000												
All	0.496	0.580	0.566	0.339	0.355	0.359	0.201	0.225	0.226	0.235	0.262	0.262
Immigrants for 1 to 5 years	0.596	0.690	0.671	0.365	0.390	0.384	0.239	0.270	0.261	0.310	0.350	0.335
Immigrants for 5 to 10 years	0.547	0.637	0.586	0.362	0.385	0.384	0.230	0.261	0.256	0.300	0.352	0.358
Immigrants for 11 to 15 years	0.527	0.594	0.585	0.350	0.368	0.381	0.214	0.239	0.250	0.256	0.298	0.331
Long-term immigrants and the Canadian-born	0.482	0.565	0.550	0.334	0.350	0.353	0.195	0.219	0.219	0.226	0.250	0.249

Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.4-1
Income inequality indexes by immigration status — Canada, Atlantic region, Quebec and Ontario

	1995	2000	2010	1995	2000	2010	1995	2000	2010	1995	2000	2010
	squared coefficient of variation			Gini coefficient			Theil index			mean log deviation		
Canada												
All	0.635	0.909	0.848	0.342	0.363	0.368	0.214	0.256	0.256	0.240	0.274	0.275
Immigrants for 1 to 5 years	0.682	1.006	0.848	0.367	0.394	0.387	0.245	0.291	0.277	0.312	0.357	0.339
Immigrants for 5 to 10 years	0.625	0.831	0.671	0.363	0.388	0.386	0.235	0.275	0.263	0.302	0.357	0.360
Immigrants for 11 to 15 years	0.648	0.811	0.730	0.353	0.373	0.384	0.224	0.256	0.262	0.260	0.304	0.336
Long-term immigrants and the Canadian-born	0.622	0.896	0.835	0.337	0.358	0.362	0.208	0.250	0.250	0.230	0.262	0.262
Atlantic region												
All	0.475	0.572	0.538	0.321	0.333	0.329	0.181	0.200	0.193	0.205	0.228	0.214
Immigrants for 1 to 5 years	0.853	1.328	0.823	0.453	0.483	0.425	0.353	0.433	0.316	0.462	0.564	0.390
Immigrants for 5 to 10 years	0.632	1.324	0.700	0.378	0.460	0.404	0.250	0.396	0.285	0.300	0.531	0.368
Immigrants for 11 to 15 years	0.765	0.644	0.666	0.358	0.404	0.413	0.239	0.279	0.290	0.269	0.375	0.388
Long-term immigrants and the Canadian-born	0.472	0.568	0.535	0.320	0.332	0.328	0.180	0.199	0.192	0.203	0.225	0.211
Quebec												
All	0.525	0.653	0.650	0.321	0.330	0.334	0.185	0.203	0.209	0.204	0.214	0.223
Immigrants for 1 to 5 years	0.573	0.707	0.630	0.344	0.372	0.359	0.214	0.250	0.233	0.269	0.299	0.291
Immigrants for 5 to 10 years	0.580	0.630	0.599	0.364	0.370	0.351	0.233	0.246	0.224	0.290	0.322	0.308
Immigrants for 11 to 15 years	0.904	0.709	0.646	0.356	0.372	0.365	0.242	0.252	0.239	0.254	0.300	0.320
Long-term immigrants and the Canadian-born	0.513	0.644	0.641	0.317	0.325	0.330	0.181	0.199	0.205	0.197	0.206	0.214
Ontario												
All	0.637	1.011	0.902	0.340	0.372	0.378	0.213	0.274	0.271	0.235	0.290	0.296
Immigrants for 1 to 5 years	0.603	0.951	0.945	0.354	0.389	0.393	0.226	0.281	0.289	0.289	0.346	0.354
Immigrants for 5 to 10 years	0.523	0.776	0.680	0.347	0.376	0.390	0.212	0.258	0.268	0.266	0.328	0.374
Immigrants for 11 to 15 years	0.597	0.764	0.698	0.344	0.363	0.382	0.211	0.244	0.257	0.242	0.287	0.337
Long-term immigrants and the Canadian-born	0.617	0.993	0.878	0.332	0.365	0.369	0.204	0.266	0.261	0.221	0.275	0.275

Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.4-2
Income inequality indexes by immigration status — Manitoba, Saskatchewan, Alberta and British Colombia

	1995	2000	2010	1995	2000	2010	1995	2000	2010	1995	2000	2010
	squared coefficient of variation			Gini coefficient			Theil index			mean log deviation		
Manitoba												
All	0.561	0.641	0.665	0.334	0.343	0.348	0.202	0.218	0.224	0.240	0.256	0.258
Immigrants for 1 to 5 years	0.376	0.482	0.355	0.311	0.315	0.281	0.173	0.186	0.148	0.230	0.235	0.183
Immigrants for 5 to 10 years	0.373	0.381	0.366	0.310	0.307	0.306	0.170	0.171	0.163	0.222	0.236	0.201
Immigrants for 11 to 15 years	0.360	0.367	0.334	0.291	0.292	0.300	0.151	0.154	0.152	0.175	0.185	0.178
Long-term immigrants and the Canadian-born	0.561	0.643	0.669	0.333	0.343	0.348	0.202	0.218	0.225	0.239	0.256	0.260
Saskatchewan												
All	0.505	0.529	0.647	0.328	0.334	0.351	0.190	0.198	0.223	0.225	0.230	0.254
Immigrants for 1 to 5 years	0.995	0.738	0.571	0.418	0.401	0.329	0.332	0.286	0.207	0.369	0.327	0.230
Immigrants for 5 to 10 years	3.444	0.874	0.726	0.409	0.408	0.391	0.444	0.314	0.272	0.360	0.387	0.310
Immigrants for 11 to 15 years	0.571	0.802	0.635	0.354	0.399	0.375	0.223	0.292	0.245	0.241	0.341	0.268
Long-term immigrants and the Canadian-born	0.493	0.526	0.646	0.326	0.333	0.350	0.188	0.196	0.222	0.223	0.228	0.253
Alberta												
All	0.820	1.028	0.987	0.353	0.367	0.381	0.239	0.270	0.282	0.260	0.282	0.291
Immigrants for 1 to 5 years	0.844	1.281	0.718	0.363	0.372	0.364	0.252	0.285	0.246	0.317	0.323	0.303
Immigrants for 5 to 10 years	0.660	0.907	0.558	0.358	0.366	0.363	0.234	0.261	0.231	0.297	0.324	0.308
Immigrants for 11 to 15 years	0.571	0.726	0.793	0.341	0.342	0.375	0.209	0.220	0.257	0.243	0.247	0.297
Long-term immigrants and the Canadian-born	0.812	1.018	0.989	0.349	0.365	0.379	0.235	0.267	0.281	0.253	0.277	0.285
British Columbia												
All	0.631	0.855	0.871	0.350	0.374	0.379	0.220	0.263	0.269	0.254	0.314	0.299
Immigrants for 1 to 5 years	0.809	1.131	0.889	0.386	0.410	0.398	0.273	0.316	0.292	0.344	0.405	0.363
Immigrants for 5 to 10 years	0.793	1.002	0.732	0.381	0.419	0.398	0.265	0.324	0.282	0.334	0.441	0.383
Immigrants for 11 to 15 years	0.635	0.999	0.784	0.353	0.394	0.393	0.223	0.291	0.276	0.246	0.359	0.346
Long-term immigrants and the Canadian-born	0.604	0.809	0.848	0.341	0.361	0.370	0.210	0.247	0.259	0.237	0.287	0.280

Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.4-3
Income inequality indexes by immigration status — Montréal, Toronto and Vancouver

	1995	2000	2010	1995	2000	2010	1995	2000	2010	1995	2000	2010
	squared coefficient of variation			Gini coefficient			Theil index			mean log deviation		
Montréal												
All	0.650	0.826	0.810	0.342	0.349	0.359	0.214	0.234	0.245	0.236	0.241	0.260
Immigrants for 1 to 5 years	0.481	0.661	0.591	0.338	0.368	0.356	0.203	0.244	0.228	0.263	0.289	0.287
Immigrants for 5 to 10 years	0.559	0.543	0.578	0.359	0.357	0.347	0.227	0.225	0.217	0.284	0.287	0.285
Immigrants for 11 to 15 years	0.654	0.662	0.676	0.350	0.360	0.363	0.223	0.235	0.237	0.245	0.269	0.295
Long-term immigrants and the Canadian-born	0.627	0.809	0.795	0.333	0.341	0.353	0.205	0.227	0.239	0.221	0.227	0.248
Toronto												
All	0.839	1.296	1.246	0.371	0.404	0.418	0.258	0.330	0.341	0.283	0.338	0.360
Immigrants for 1 to 5 years	0.574	0.857	0.945	0.350	0.376	0.386	0.221	0.261	0.281	0.285	0.324	0.340
Immigrants for 5 to 10 years	0.530	0.703	0.651	0.348	0.366	0.381	0.213	0.242	0.255	0.269	0.306	0.345
Immigrants for 11 to 15 years	0.584	0.727	0.714	0.347	0.358	0.376	0.213	0.235	0.251	0.246	0.270	0.308
Long-term immigrants and the Canadian-born	0.793	1.247	1.204	0.355	0.392	0.408	0.240	0.317	0.329	0.255	0.312	0.335
Vancouver												
All	0.741	1.048	1.068	0.366	0.396	0.405	0.245	0.300	0.312	0.281	0.349	0.348
Immigrants for 1 to 5 years	0.829	1.051	0.951	0.386	0.409	0.400	0.273	0.311	0.298	0.343	0.398	0.366
Immigrants for 5 to 10 years	0.806	0.972	0.759	0.383	0.417	0.402	0.266	0.318	0.287	0.335	0.425	0.388
Immigrants for 11 to 15 years	0.698	1.068	0.825	0.358	0.394	0.397	0.233	0.294	0.283	0.253	0.345	0.354
Long-term immigrants and the Canadian-born	0.683	0.959	1.021	0.348	0.372	0.392	0.224	0.270	0.296	0.248	0.299	0.318

Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.5
Decomposition of the change in the squared coefficient of variation

	1995-to-2000 change					2000-to-2010 change				
	Four components					Four components				
	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total
	squared coefficient of variation									
Canada										
Immigrants for 1 to 5 years	0.003	0.004	0.002	-0.005	0.005	-0.001	-0.002	-0.001	0.002	-0.002
Immigrants for 5 to 10 years	-0.002	0.002	-0.001	0.005	0.004	0.001	-0.003	0.000	-0.001	-0.002
Immigrants for 11 to 15 years	-0.001	0.002	0.001	0.001	0.003	-0.005	-0.001	0.002	0.001	-0.002
Long-term immigrants and the Canadian-born	0.007	0.266	-0.007	-0.004	0.263	0.017	-0.059	-0.009	-0.004	-0.055
Sub-component total	0.007	0.275	-0.004	-0.003	0.274	0.012	-0.065	-0.007	-0.002	-0.062
Montréal										
Immigrants for 1 to 5 years	0.005	0.002	0.009	-0.011	0.005	0.000	-0.001	-0.006	0.006	-0.001
Immigrants for 5 to 10 years	-0.001	0.000	-0.006	0.006	-0.001	0.007	0.000	0.001	-0.005	0.004
Immigrants for 11 to 15 years	-0.001	0.000	0.000	0.001	0.000	0.001	0.000	-0.001	0.001	0.001
Long-term immigrants and the Canadian-born	-0.007	0.179	-0.001	0.001	0.173	0.010	-0.014	-0.015	-0.002	-0.021
Sub-component total	-0.004	0.181	0.002	-0.003	0.176	0.019	-0.014	-0.020	-0.001	-0.016
Toronto										
Immigrants for 1 to 5 years	0.003	0.009	0.011	-0.012	0.010	-0.003	0.002	0.005	-0.004	0.001
Immigrants for 5 to 10 years	-0.008	0.005	-0.010	0.014	0.002	0.007	-0.002	0.005	-0.009	0.001
Immigrants for 11 to 15 years	-0.003	0.004	0.000	0.005	0.006	-0.006	0.000	0.000	0.005	-0.001
Long-term immigrants and the Canadian-born	0.064	0.433	-0.039	-0.018	0.439	-0.031	-0.041	0.017	0.005	-0.050
Sub-component total	0.056	0.450	-0.039	-0.011	0.457	-0.033	-0.041	0.027	-0.003	-0.050
Vancouver										
Immigrants for 1 to 5 years	-0.003	0.007	0.006	-0.006	0.004	0.011	-0.003	0.006	-0.014	0.002
Immigrants for 5 to 10 years	-0.007	0.003	-0.007	0.016	0.005	0.010	-0.007	0.007	-0.015	-0.005
Immigrants for 11 to 15 years	-0.004	0.009	0.001	0.002	0.007	-0.008	-0.006	0.008	0.003	-0.004
Long-term immigrants and the Canadian-born	0.086	0.263	-0.037	-0.022	0.289	-0.058	0.059	0.016	0.011	0.028
Sub-component total	0.071	0.283	-0.038	-0.010	0.306	-0.045	0.043	0.037	-0.015	0.020

Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.6
Decomposition of the change in the Theil index

	1995-to-2000 change					2000-to-2010 change				
	Four components					Four components				
	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total
	Theil index									
Canada										
Immigrants for 1 to 5 years	0.001	0.001	0.001	0.000	0.003	0.000	0.000	0.000	0.000	-0.001
Immigrants for 5 to 10 years	-0.001	0.001	0.000	0.000	-0.001	0.000	0.000	0.000	0.000	0.000
Immigrants for 11 to 15 years	0.000	0.000	0.000	0.000	0.000	-0.002	0.000	0.001	-0.001	-0.001
Long-term immigrants and the Canadian-born	0.003	0.040	-0.002	0.000	0.040	0.005	0.000	-0.002	0.000	0.003
Sub-component total	0.002	0.042	-0.002	-0.001	0.042	0.004	0.000	-0.002	-0.001	0.001
Montréal										
Immigrants for 1 to 5 years	0.002	0.001	0.003	-0.001	0.005	0.000	0.000	-0.002	0.000	-0.003
Immigrants for 5 to 10 years	0.000	0.000	-0.002	0.000	-0.003	0.003	0.000	0.000	0.000	0.003
Immigrants for 11 to 15 years	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Long-term immigrants and the Canadian-born	-0.002	0.021	0.000	0.000	0.018	0.003	0.012	-0.004	0.000	0.011
Sub-component total	-0.001	0.022	0.001	-0.001	0.020	0.007	0.011	-0.006	0.000	0.011
Toronto										
Immigrants for 1 to 5 years	0.001	0.002	0.004	-0.001	0.007	-0.001	0.001	0.002	0.000	0.002
Immigrants for 5 to 10 years	-0.003	0.001	-0.004	-0.001	-0.007	0.003	0.001	0.002	0.000	0.005
Immigrants for 11 to 15 years	-0.001	0.001	0.000	0.000	-0.001	-0.002	0.001	0.000	-0.001	-0.003
Long-term immigrants and the Canadian-born	0.022	0.066	-0.012	-0.003	0.073	-0.009	0.010	0.004	0.000	0.006
Sub-component total	0.019	0.070	-0.012	-0.005	0.072	-0.009	0.013	0.008	-0.001	0.011
Vancouver										
Immigrants for 1 to 5 years	-0.001	0.002	0.003	0.000	0.003	0.004	-0.001	0.003	-0.001	0.005
Immigrants for 5 to 10 years	-0.002	0.002	-0.004	-0.001	-0.006	0.004	-0.002	0.003	-0.001	0.004
Immigrants for 11 to 15 years	-0.002	0.002	0.000	0.000	0.000	-0.003	0.000	0.001	-0.002	-0.005
Long-term immigrants and the Canadian-born	0.031	0.041	-0.013	-0.002	0.057	-0.018	0.022	0.005	0.000	0.008
Sub-component total	0.025	0.047	-0.014	-0.004	0.055	-0.014	0.019	0.011	-0.004	0.012

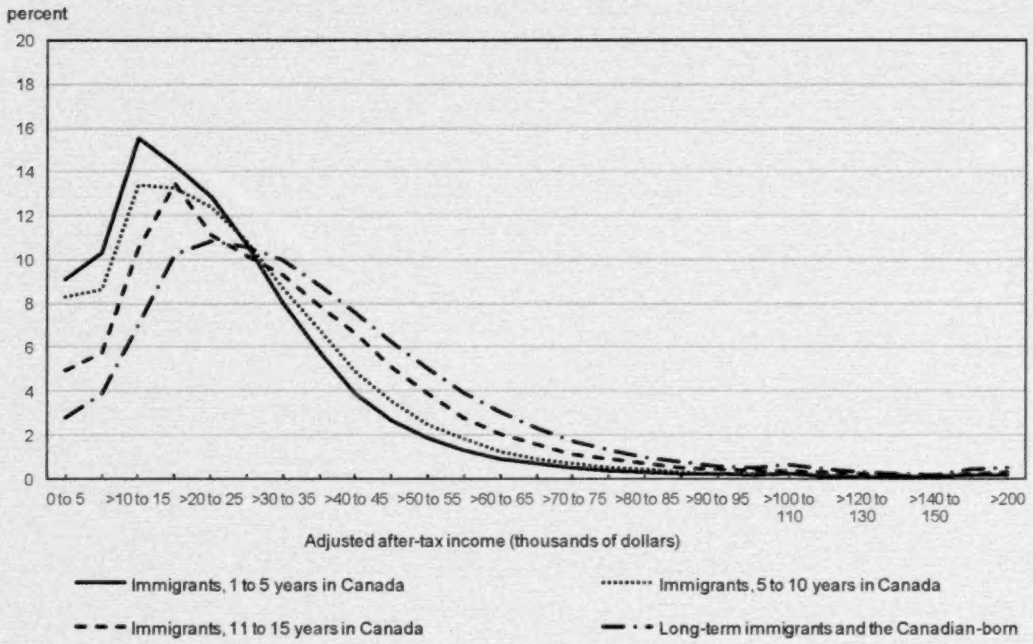
Source: Statistics Canada, Longitudinal Administrative Databank.

Table A.7
Decomposition of the change in the mean log deviation

	1995-to-2000 change					2000-to-2010 change				
	Four components					Four components				
	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total	Between-group inequality	Within-group inequality	Group population share	Joint changes	Sub-group total
	mean log deviation									
Canada										
Immigrants for 1 to 5 years	-0.002	0.002	-0.005	0.000	-0.006	0.001	-0.001	0.003	0.000	0.003
Immigrants for 5 to 10 years	0.001	0.001	0.008	0.002	0.012	-0.001	0.000	-0.002	0.000	-0.002
Immigrants for 11 to 15 years	0.000	0.001	0.001	0.000	0.003	0.002	0.001	0.003	0.001	0.007
Long-term immigrants and the Canadian-born	-0.002	0.030	-0.002	0.000	0.025	-0.004	-0.001	-0.002	0.000	-0.007
Sub-component total	-0.003	0.033	0.002	0.002	0.034	-0.002	-0.001	0.003	0.001	0.001
Montréal										
Immigrants for 1 to 5 years	-0.005	0.001	-0.013	0.001	-0.016	0.000	0.000	0.012	0.000	0.012
Immigrants for 5 to 10 years	0.001	0.000	0.011	0.000	0.012	-0.005	0.000	-0.002	0.000	-0.007
Immigrants for 11 to 15 years	0.001	0.000	0.001	0.000	0.002	-0.001	0.001	0.002	0.000	0.002
Long-term immigrants and the Canadian-born	0.002	0.005	0.000	0.000	0.007	-0.003	0.019	-0.003	0.000	0.013
Sub-component total	-0.002	0.007	-0.002	0.002	0.005	-0.009	0.019	0.009	0.000	0.020
Toronto										
Immigrants for 1 to 5 years	-0.003	0.004	-0.018	0.000	-0.017	0.002	0.001	-0.010	0.000	-0.007
Immigrants for 5 to 10 years	0.006	0.002	0.023	0.005	0.036	-0.005	0.004	-0.012	0.000	-0.013
Immigrants for 11 to 15 years	0.001	0.001	0.008	0.001	0.012	0.003	0.002	0.009	0.002	0.016
Long-term immigrants and the Canadian-born	-0.015	0.045	-0.006	-0.001	0.024	0.006	0.018	0.002	0.000	0.026
Sub-component total	-0.010	0.053	0.008	0.004	0.055	0.006	0.025	-0.011	0.002	0.022
Vancouver										
Immigrants for 1 to 5 years	0.003	0.006	-0.013	-0.001	-0.007	-0.008	-0.003	-0.017	0.002	-0.026
Immigrants for 5 to 10 years	0.005	0.004	0.035	0.010	0.053	-0.006	-0.003	-0.025	0.003	-0.032
Immigrants for 11 to 15 years	0.002	0.003	0.002	0.001	0.008	0.004	0.000	0.020	0.003	0.027
Long-term immigrants and the Canadian-born	-0.021	0.042	-0.007	-0.001	0.013	0.012	0.014	0.002	0.000	0.029
Sub-component total	-0.012	0.055	0.017	0.008	0.067	0.001	0.009	-0.020	0.009	-0.001

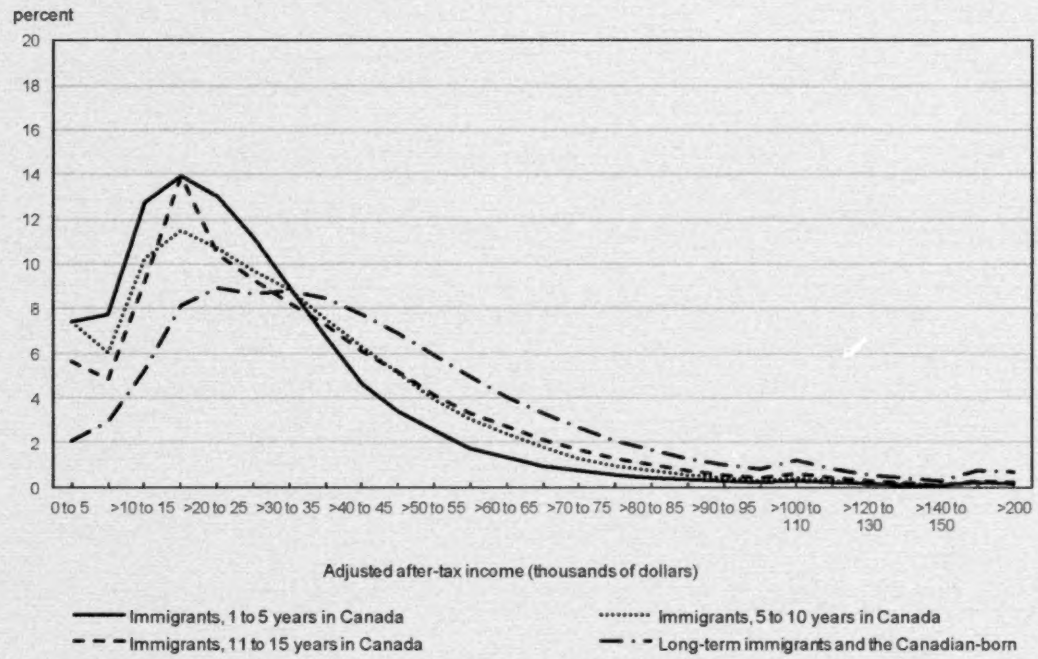
Source: Statistics Canada, Longitudinal Administrative Databank.

Chart A.1
The distibution of adjusted after-tax income, 2000



Source: Statistics Canada, Longitudinal Administrative Databank.

Chart A.2
The distibution of adjusted after-tax income, 2010



Source: Statistics Canada, Longitudinal Administrative Databank.

Appendix B: Decomposing the squared coefficient of variation, Theil and mean log deviation indexes

This paper decomposes the three inequality indexes to assess the contribution of each of four groups to the change over time in the index. The four groups used here are immigrants in Canada for 1 to 5 years, 6 to 10 years, or 11 to 15 years, and the remainder of the Canadian population, although this approach can be used for groups defined in any way. Following is the algebraic development of this decomposition.

At a given time point, the CV^2 can be written as the sum of two terms: one is attributable to within-group income inequality, $\sum P_i CV_i^2 R_i^2$, the second is attributable to between-group inequality, $\sum P_i \left(R_i^2 - 1\right)$, where P_i is the population share of group i (in our study, i =1 to 4), CV_i^2 is the CV^2 for group i, and R_i is the ratio of the mean income of group i to the mean income of the total population.

By straightforward algebraic manipulation, the change in CV^2 over two time points can be decomposed into four terms.

$$\Delta CV^2 = \sum \Delta P_i \left(CV_i^2 R_i^2 + R_i^2 - 1\right) + \sum \Delta CV_i^2 P_i R_i^2 + \sum \Delta R_i^2 P_i \left(CV_i^2 - 1\right) + joint\ changes.$$

The first term is the contribution of changes in the population shares among groups; the second term is the contribution of changes in within-group inequality; the third term is the contribution of changes in between-group income inequality; and the fourth term is the joint changes of population shares, within-group inequality, and between-group inequality. The joint change term includes $\sum \Delta P_i \Delta CV_i^2 R_i^2 + \sum \Delta P_i CV_i^2 \Delta R_i^2 + \sum P_i \Delta CV_i^2 \Delta R_i^2 + \sum \Delta P_i \Delta CV_i^2 \Delta R_i^2 + \sum \Delta P_i \Delta R_i^2$. The joint change is generally very small.

The same approach can be used with the Theil index. At a given time point, the Theil index T can be expressed as the sum of two terms: $\sum P_i T_i R_i$, the component representing within-group income inequality, and $\sum P_i \ln\left(R_i\right)$, the component representing between-group income inequality, where P_i and R_i are defined the same as the above, T_i is the Theil index for group i.

The change in T over two time points can be decomposed into four terms.

$$\Delta T = \sum \Delta P_i R_i \left(T_i + \ln R_i\right) + \sum \Delta T_i P_i R_i + \left[\sum \Delta P_i R_i \left(T_i + \ln R_i\right) + \sum \Delta \ln R_i P_i \left(R_i + \Delta R_i\right)\right] + joint\ changes.$$

The first term is the contribution of changes in the population shares among groups; the second term is the contribution of changes in within-group inequality; the third term is the contribution of changes in between-group income inequality; and the fourth term is the joint changes of population shares, within-group inequality, and between-group inequality. The joint change term includes

$$\sum T_i \Delta P_i \Delta R_i + \sum \Delta T_i \Delta P_i R_i + \sum \Delta T_i P_i \Delta R_i + \sum \Delta T_i \Delta P_i \Delta R_i + \sum \Delta P_i \Delta R_i \ln\left(R_i\right) + \sum \Delta P_i R_i \Delta \ln\left(R_i\right) + \sum \Delta P_i R_i \Delta \ln\left(R_i\right) + \sum \Delta P_i \Delta R_i \Delta \ln\left(R_i\right).$$

At a given time point, the mean log deviation, L, can be written as the sum of two terms: $\sum P_i L_i$, the component representing within-group income inequality; and $\sum P_i \ln(R_i)$, the component representing between-group income inequality, where L_i is the income inequality index for group i. The change in L over two time points can be decomposed into four terms:

$$\Delta L = \sum \Delta P_i \left[L_i + \ln(R_i) \right] + \sum \Delta L_i P_i + \sum \Delta \ln(R_i) P_i + \textit{joint changes}.$$

The joint change term includes $\sum \Delta L_i \Delta P_i + \sum \Delta P_i \Delta \ln(R_i)$.

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